April 3, 2003

TO: Members, University Senate

FROM: University Senate Council

RE: Course/Program Actions: Effective Date: Summer Semester, 2003,
               UNLESS OTHERWISE NOTED.

        The Senate Council circulates for your approval the following curricular actions. Objections will be accepted from University Senators and faculty members and must be received within ten days of receipt of this notice. All other requirements for the courses or programs as approved below must be met.

SENATE COUNCIL

THE GRADUATE SCHOOL

Proposal for a Graduate Certificate in Human Technology Interaction
A proposal for a Graduate Certificate in HumanTechnology Interaction seeks to bridge the gap between knowledge about the physical, cognitive, and social characteristics of people, on the one hand, and theory and practice of system design, on the other. The premise of this multi-disciplinary field is that the development of new systems should be user-centered. The ultimate goal is to ensure that technological innovations enhance the safety, comfort, productivity, and pleasure of the "human factor" in the system, regardless of whether the system is a complex manufacturing process, a transportation network, or a consumer product.

The complete proposal is reproduced below.

Introduction:
        The study of human-technology interaction seeks to bridge the gap between knowledge about the physical, cognitive, and social characteristics of people, on the one hand, and theory and practice of system design, on the other.   The premise of this multi-disciplinary field is that the development of new systems should be user-centered. The ultimate goal is to ensure that technological innovations enhance the safety, comfort, productivity, and pleasure of the "human factor" in the system, regardless of whether the system is a complex manufacturing process, a transportation network, or a consumer product.

The proposed certificate reflects the content of the profession usually known as "human factors engineering" (HFE) or "ergonomics," although the term "usability engineering" is often used by designers of consumer products and information technology. The study of HFE has been recognized as a specialty since the 1950s, with the formation of the Human Factors Society in the U.S., and the Ergonomics Association in Europe. Early collaborations brought together engineers and experimental psychologists who worked to reduce aviation accidents and to increase the efficiency of human-machine systems in both the military and industry. HFE has also been applied to other large-scale systems, including ground transportation, manufacturing, and process control. The demand for qualified usability specialists has recently accelerated with the growth of information technologies and sophisticated consumer products. Human-computer interaction is now a focus of much HFE research.

Need for the Certificate

The certificate would serve a number of purposes, including recruitment and retention of high-quality graduate students, facilitation of collaboration among faculty with overlapping interests and complementary expertise (see attached table of faculty associates), professional development for post-baccalaureate students, and support of economic development efforts involving technology transfer and start-ups within the Commonwealth.

Professional development for post-baccalaureate students. The proposed certificate is designed to build on current undergraduate and graduate programs to provide students with the minimal necessary preparation to sit the certification exam administered by the Board of Certification of Professional Ergonomists (BCPE). The details of these requirements are described below as the foundation for the proposed curriculum.

Support for current graduate programs. The certificate could be used to attract applicants to the graduate programs contributing to the certificate. It would allow advertising of these programs through a larger number of outlets, for example through websites dedicated to promoting graduate training in human factors, ergonomics, industrial engineering, and usability engineering.

Support for technology transfer. The need for technology transfer is high in the field of usability engineering. Software and hardware developers are in need of human factors knowledge to design effective programs and usability testing. The certificate's faculty associates are strategically positioned to form a consulting group to meet this need. The University of Kentucky Office of Intellectual Property is actively engaged to work more closely with technology firms in the Commonwealth, in particular in Louisville, Lexington, and in the Northern Kentucky/Covington areas. Mazur, a coordinator of the proposed certificate, serves on the university Intellectual Property Committee and would work to develop an active program of consulting options with the intellectual property office. Additionally, such a consulting group will also provide apprenticeship-type experiences for students pursuing the certificate. The development of the human-technology interaction consulting group would directly address the following objectives and enabling strategies of the UK strategic plan:

Objective: Increase integration of the research, instruction, and service missions, while applying the expertise and scholarship of a land grant university to benefit the Commonwealth, the nation, and the world.

Enabling Strategies:

– Enhance the application of research findings to improve the quality of life of both urban and rural populations in the Commonwealth.

– Participate as an essential partner in the development of the Commonwealth's economy.

– Build cooperative programs with other institutions in the Commonwealth, throughout the nation, and around the world.

– Promote the development of intellectual property arising from University research and facilitate its licensing.

– Increase public awareness of the benefits of University research, instruction, and service.

Content of Certificate Curriculum

The structure of the proposed curriculum is guided by the minimum content requirements set forth by the Board of Certification of Professional Ergonomists (BCPE). The BCPE requires a survey of the knowledge of human physical and mental capacities that are relevant to design (human sensation/perception, cognition, work physiology, biomechanics, and anthropometry). In addition, students must understand the application of basic HFE research, design, and evaluation methods within the context of one engineering or design domain.

The Certified Ergonomics Associate (CEA) is the entry-level designation of minimal competence in the field. It requires a bachelor's degree in a relevant biological, behavioral, or design discipline (e.g., kinesiology, psychology, engineering, industrial design, or instructional design). Further, the Board requires the following contact hours (note that 40 hours is deemed equivalent to one three-hour semester course):

A.   **15 hours** of exposure to **ergonomics principles** (systems theory; the human as a systems component; human-centered design; designing for individuals vs. designing for populations; designing for common vs. extreme environments).

B   **50 hours** of exposure to critical **human characteristics** (biomechanics and posture; anthropometry; energy and force production; individual, gender-related, racial, cultural, and developmental variability; psychophysical, psychophysiological, and cognitive aspects of information intake, information handling, and decision-making).

  C. **65 hours** of exposure to **work analysis and measurement** (dynamic and static simulation; methods of observing activity and performance; interviews and questionnaires; epidemiological approach; sampling procedures; checklists; activity analysis; task analysis; function analysis; task interdependency).

  D. **65 hours** of exposure to **people and technology** (application domain; familiarity with human factors design issues in one of the following areas – consumer products, office work; transportation; process industry; automation; health care; architecture; recreation; arts and leisure; must also have familiarity with training and instruction).

  E. **5 hours** of exposure to **professional issues** (legislation; role of HFE in settings with different interest groups; HFE in organizational context; ethics).

  Total 200 total hours (= 15 semester hours) of disciplinary content.

Taking into account these minimal Board of Certification requirements, the following framework is proposed:

(1) Foundations: (6 semester hours):

  Two of the following:

  PSY 502: Psychology, Technology, and Design (3) – currently being proposed. for once a year
    offering; offered Spring 2002 as PSY 562 – Advanced Topics in Cognition (Carswell)
  KHP 618: Work Hardening and Ergonomics (3) – offered every spring (Yates)
  PSY 780: Special Problems in Psychology: Engineering Psychology and Human
    Performance (3) – offered once every two years. (Carswell)

(2) Applications and Methods (6 semester hours):

  Two of the following, one of which must have a methodology focus*:

  The additional course from the list of "foundations"
  AE 695 – Aesthetics and Design (McCrary)
  CS 585: Intermediate Topics in Comp. Sci:
    "Exploring Virtual Worlds" (Seales)
    "Graphics and Multimedia" (Seales)
  EDC 548 - Instructional Computing II (Smith).
  EDC 607-8: Instructional Design I, II (Anglin)*
  EDC 609: Interactive Multimedia Research and Design (Mazur)*
  EDC 611: Authoring Applications for Technology-Based Instruction. (Smith).
  EDC 771: Social Design and Research of Interactive Systems (Mazur, Fall 2002)*
  PSY 780: Problems in Psychology:

"Attention and Performance". (Gottlob, Carswell)
"Attention, Comprehension, and Mass Media" (E. Lorch)..
"Cognitive Simulation and Modeling" (Gottlob)*
"Cognitive Aging" (Gottlob)
"Cognitive Development" (E. Lorch)
"Human Error and Accident Investigation" (Carswell)*
        "Drugs and Performance" (Fillmore)
"Goal-Setting, Expectancies, and Performance" (Fillmore)
"Text Processing" (R. Lorch)
KHP 640: Lab Methods in Exercise Science*
KHP 610: Motor Control 1: Muscles, Strength, and Movement
KHP 650: Motor Control II: Reflexes, Cognition, and Movement
CE 635: Transportation Safety (Stamatiadis)*
TEL 555: Cyberspace and Communication

Because many of these courses are topical seminars, and are therefore offered on a routine basis, announcements will be made on a certificate website during each pre-registration about appropriate courses. It should be noted, however, that a number of the courses are offered at least once every two years.

(3) Research or Internship Experience (3 semester hours):

One semester of supervised research or internship will be required of each student, depending on his/her interests and background. Research will be conducted in certificate associates' labs. Internships at usability labs or with local HFE consultants are also encouraged for those students with no formal design experience.

<u>Admissions Requirements</u>

In addition to meeting the graduate school's requirements for admission as a post-baccalaureate student, applicants who wish to pursue the human-technology interaction certificate should:

1) Hold a bachelor's degree in a human science field (social, behavioral, or biological) OR in one of the design professions (any engineering discipline, instructional design, architecture, graphic design, industrial design, or interior design) OR be currently enrolled in a graduate program in one of these fields.

2) Students should have completed a graduate-level course in research methodology (including a quantitative analysis component) that is appropriate for the field of their major.

Human-Technology Interaction Faculty Associates					
Faculty Member	**Department**	**Offer Foundation Course?**	**Offer Other Courses?**	**Supervise Research or Service?**	**Coordinate Certificate?**
Anglin, Gary	Curriculum and Instruction	NO	EDC 607-8 Intro. to Instructional Design	YES	NO
Carswell, Melody	Experimental Psychology	PSY 502 PSY 780	Possible Topical Seminars: Human Error; Usability Methods.	YES	YES
Childers, Terry	Marketing	NO	Possible Topical Seminar: E-Commerce and Human Behavior	YES	NO
Fillmore, Mark	Experimental Psychology	NO	Possible Topical Seminar: Drugs and Behavior	YES	NO
Gottlob, Larry	Experimental Psychology	NO	Possible Topical Seminars: Attention, Cognitive Aging, Modeling of	YES	NO

Human-Technology Interaction Faculty Associates					
			Cognitive Processes.		
Lorch, Elizabeth	Experimental Psychology	NO	Possible Topical Seminars: Cognitive Develop-ment; Attention, Compre-hension and Mass Media	YES	NO
Lorch, Robert	Experimental Psychology	NO	Topical Seminars: Text Processing	YES	NO
Mazur, Joan	Curriculum and Instruction	NO	EDC 609–Interactive Multimedia Research; EDC 771--"Social Design and Research of Interactive Systems"	YES	YES
McCrary, Nancye	Art Education	NO	A-E 695 Aesthetics and Design	YES	NO
Santhanam, Radhika	Decision Science and Information Systems	NO	NO	YES	NO
Seales, Brent	Computer Science	NO	Topical Seminars:	YES	NO

Human-Technology Interaction Faculty Associates					
			Exploring Virtual Worlds; Graphics and Multimedia		
Smith, Doug	Curriculum and Instruction	NO	EDC 548 - Instructional Computing II. EDC611 - Authoring Applications for Technology-Based Instruction.	YES	NO
Stamatiadis, Nick	Civil Engineering	NO	CE 635 – Traffic Safety	YES	NO
Yates, J.W.	Kinesiology & Health Promotion	KHP 781	NO	YES	NO

Letters of support from associated faculty and administrators, including Linda Levstik, Professor and Chair, Curriculum and Instruction; Rick Hoyle, Professor and Chair, Psychology; Howard Grotch, Dean, College of A&S; and Edgar Sagan, Acting Dean, College of Education; are available upon request

Below find the review of the proposal by Associate Dean James E. O'Reilly written to Graduate Dean Doug Kalika:

I have reviewed the proposal (P003) from Drs . Melody Carswell and Joan Mazur to establish a new Graduate Certificate in Human-Technology Interaction. The objective of the certificate is to provide a focused curriculum in the area of human factors engineering, perhaps more commonly known as ergonomics.

The document addresses all the important items for the establishment of a new certificate. I find it to be well written and sound. There are at least 14 graduate faculty associated with the certificate, thus helping to ensure the timely delivery of appropriate course work and the allied research/internship experience. Positive endorsements from the department chairs and college

deans of the two coordinating faculty involved are included. With one exception, addressed below, all the required and elective courses for the certificate are currently approved UK courses.

There are a few very specific points not explicitly stated in the proposal, entmerated below, that I have clarified with Dr. Carswell in the course of my review. I include them here as an addendum. I did not feel it was necessary to rewrite the whole proposal to include them.

1 .
One required course is not yet an approved regular course -- PSY 502. Dr. Carswell has taught this periodically in the past as a Topics course, PSY 562, and is now in the process of converting this to a regular course for this certificate . I do not see the need to hold up review of the certificate until this course is approved because many other certificate courses are already regularly offered. Students who have taken PSY 562 in the past will be able to use it as a reasonable substitute for PSY 502; the two will, in fact, be identical.

2. Drs. Carswell and Mazur will both be coordinating the certificate curriculum and will periodically trade off the administrative work involved. Their recommendation is that the initial Director of the certificate be Dr. Carswell.

3 .Their printed and electronic information about the certificate will clearly state that both UK degree-seeking and Post-baccalaureate students are eligible to apply for admission to the certificate . The minimum Graduate School admission requirements for each status will be applicable, in addition to the two other stated admission requirements.

4.Their printed and electronic information will clearly state that a minimum GGPA of 3 .00 in the course work for the certificate is necessary for award of the certificate.

5. Their printed and electronic information will clearly state that the Applications & Methods elective courses (6 cr) and the Research/Internship course(s) (3 cr) must be approved by the certificate Director.

Given these small points, I am pleased to recommend this proposed graduate certificate for your review and positive recommendation to the Graduate Council. I believe it will be a fine addition to our growing complement ofhigh-quality certificate curricula.

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